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# The SPINOSE EAR TICK



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**E**AR TICKS are blood-sucking parasites which infest the ears of cattle, horses, sheep, dogs, and other animals. They are prevalent in the semiarid sections of the southwestern part of the United States, where they cause heavy losses among livestock.

The parasites cannot be eradicated by dipping, but they may be controlled and the losses prevented by injecting into the ears of infested animals a mixture of lindane-pine oil or chlordane-pine oil or a mixture of pine tar and cottonseed oil. Another method is to apply a pyridine-adhesive mixture with a paint brush.

A brief description of the spinose ear tick, its life history, and instructions for treating infested animals are given in this bulletin.

# The Spinoose Ear Tick and Methods of Treating Infested Animals<sup>1</sup>

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THE SPINOSE EAR TICK<sup>2</sup> takes its common name from the characteristic spines on the body of the young tick and from its habit of locating in an animal's ears. This parasite is especially prevalent in the arid and semiarid sections of the southwestern part of the United States, the infested area extending, however, to the Rocky Mountain States as far north as Montana and even into Oregon. The climate in parts of Texas, Oklahoma, New Mexico, Arizona, and California seems favorable for the rapid multiplication of ear ticks, which have become prevalent in those States. They are also widely distributed in parts of Mexico and South America. The ticks remain attached in the ears of animals for several months, and shipments of livestock from infested areas to various points in the United States have caused the ticks to become widely disseminated. Moisture, however, is apparently detrimental to the ticks during certain stages in their life cycle, as they have not established themselves in any part of the United States except the arid and semiarid sections of the Southwest and Pacific coastal region.

Among domesticated animals, the ticks are found most frequently in the ears of cattle, horses, dogs, and sheep. Under favorable conditions they often attach themselves to other animals, such as goats, hogs, and cats, and occasionally even man. Wild animals, such as coyotes, deer, mountain sheep, and especially jack rabbits, often harbor ear ticks.

As the movement of wild animals cannot readily be controlled, eradication of ticks by excluding susceptible animals from infested areas to bring about the starvation of the ticks is impracticable.

<sup>1</sup>This is a revision of former editions by Marion Imes, retired.

<sup>2</sup>*Otobius megnini* (syn. *Ornithodoros megnini*).

Serious damage to livestock is caused by the spinose ear tick in areas where it is abundant. It is not unusual to find the ear canals of cattle and horses completely filled with a mingled mass of ticks, ear wax, and other matter (fig. 1, *A*). As many as 75 ticks, by actual count, have been taken from an ear of a cow selected at random from an infested herd. The parasites puncture the tender skin of the ear and suck blood from the animal. The wounds thus caused occasionally become infected with pus-forming organisms, giving rise to a condition commonly known as "ear canker." Constant irritation caused by heavy infestations may result in a loss of flesh and an unthrifty appearance. Added to the damage caused by the ear tick is the constant danger of screwworm fly attack in areas where this pest is prevalent. When animals are badly annoyed by ticks, they may scratch their ears and produce wounds which attract screwworm flies. Old range cows and weak, poorly nourished animals when heavily infested often die during late winter and early spring.

## **Nature and Habits of Ear Ticks**

Investigations by the Bureau of Entomology and Plant Quarantine show that spinose ear ticks do not spend their entire life on the animal. They enter the animal's ears as small, active, six-legged seed ticks, or larvae, not easily visible to the naked eye. Usually they attach themselves to the tender skin inside the ears below the hair line, where they are protected from natural enemies as well as from the efforts of the animal to dislodge them. They begin at once to engorge with blood and in a week or two are fully engorged. Although still small, they have grown to several times their original size.

The engorged larvae are inactive, grublike in appearance (fig. 1, *B*), and of a yellowish-white or pink color. When these larvae shed their skin the young ticks, or nymphs, emerge, provided with eight legs (fig. 1, *C*). The skin of the nymph is covered with numerous small spines (fig. 1, *D* and *E*). Before they begin to engorge, the nymphs are about the same size as the engorged larvae, that is, about one-eighth of an inch in length. They attach themselves to the skin lining of the ear, suck blood, and slowly increase in size. Occasionally they change their location. Unless destroyed or accidentally dislodged, they remain in the ears from 1 to 7 months, or until they are fully grown and completely engorged with blood. Their length then ranges from about one-third to two-fifths of an inch (fig. 1, *E*).

Finally, upon completion of their development as parasites, they drop out of the ears to the ground and then usually crawl several feet up the sides of buildings, fences, corral walls, or trees, hiding themselves in dry protected places, such as cracks and crevices. After a few days, the nymphs shed their skins and undergo transformation into adult ticks (fig. 1, *F* and *G*), mating takes place, and eggs are laid.

The skin of the adult, unlike that of the nymph, is without spines. So far as is known, the spinose ear tick is parasitic only in the larval and nymphal stages, and the adult never attaches itself to a host, nor does it take food. Soon after mating, the females begin laying eggs. Egg laying may be intermittent and continue over a period as long as 6 months. When egg laying is completed, the females die. Females which do not find a mate have been known to live more than a year.

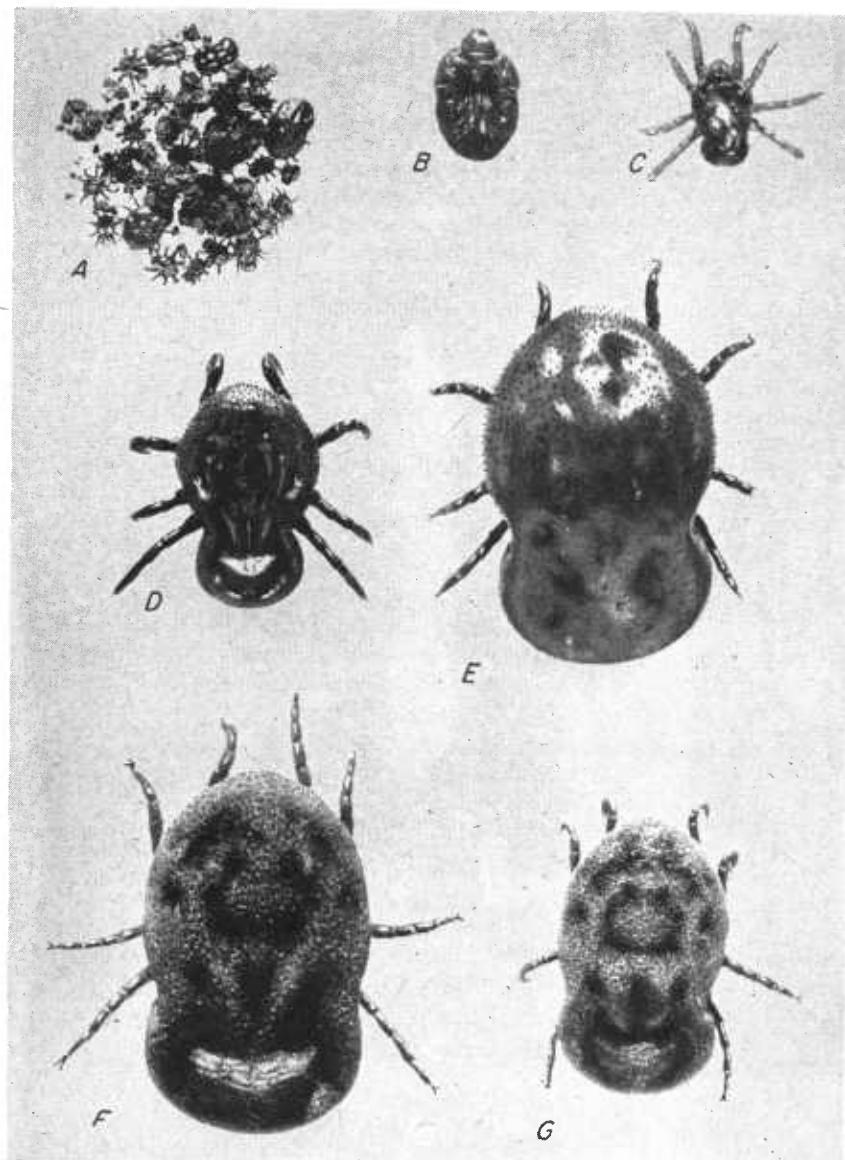


Figure 1.—A, Ear ticks and debris (about natural size) from ear of cow; B, engorged larva (magnified five times); C, young tick (magnified five times); D, partially engorged young tick (magnified five times); E, fully engorged young tick (magnified five times); F, adult female (magnified five times); G, adult male (magnified five times).

The eggs may hatch as soon as 10 days after they are laid. Shortly after hatching, seed ticks are ready to attach themselves to any suitable animal with which they come in contact. They have been known, however, to live nearly 3 months without doing so.

## Detecting the Ticks

When animals are heavily infested and the ear canals are packed full of ticks, the parasites are visible on superficial examination, but when the infestation is light or moderate, the ticks may easily be overlooked. They usually attach themselves in the deep folds of the ear or crawl into the ear canal and follow it inward, sometimes as far as the eardrum. As the ticks increase in size and others enter, they and their excretions, together with the ear wax of the animal, accumulate in masses or plugs sufficient in some cases to close up the ear passages completely.

This condition gives rise to various symptoms. The infested animal usually shakes its head and repeatedly turns it from side to side. When irritation and itching are more intense on one side, the animal often turns its head toward that side, and the more seriously affected ear is held lower than the other. There is a tendency for the animal to rub and scratch the ears in an endeavor to relieve the irritation, and this may result in extensive lacerations.

In areas where screwworm flies are also present, such wounds invite attacks by this parasite, and coincident infestations, unless properly treated, usually prove serious and may result in death of the animal. Horses and dogs seem to be more sensitive than cattle to the pain and irritation. They scratch and rub their ears, shake their heads, and often lie down and roll, rubbing their ears on the ground.

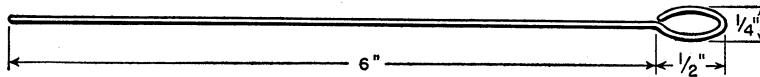


Figure 2.—Ear probe made of baling wire.

If ear tick infestation is suspected, examine the animals. If no ticks are visible, probe the ears, taking care, however, to avoid injury to the delicate lining of the ear passages. A convenient and effective instrument for probing the ears, and for removing the masses of ear wax and ticks, may be made from a piece of ordinary baling wire (fig. 2).

## Treatment of Infested Animals

On account of their habits and great vitality, and the wide range of the animals which they may infest, spinose ear ticks are difficult to eradicate completely. Dipping in any of the known dips is not effective in killing the ticks or causing them to leave the ears. The only effective method of treatment known at present is to apply a remedy by hand directly in the ear passages (fig. 3). Bland oils, crude petroleum, various dips, etc., are not effective, and are of use only as the mediums for applying other remedies.

For a number of years some of the livestock growers in the infested areas have used kerosene or gasoline in treating animals for ear ticks.



Figure 3.—Treating cattle for ear ticks. Cattle in chute are restrained in a "squeeze gate." Operator is employing the spring-bottom oiler and manipulating the ear.

When applied either undiluted, or diluted with an equal part of discarded engine lubricating oil, these substances will kill the ticks, but may cause irritation and inflammation of the tender skin lining the ear passages, and may even result in deafness. As both kerosene and gasoline evaporate rapidly, they offer little or no protection against immediate reinfestation. Consequently, these remedies are not suitable for use in the ears of domesticated animals, and under no circumstances should they be used on horses or dogs. Chloroform, either undiluted or mixed with a bland oil, is commonly used in the ears of horses and dogs. It is effective, but it also affords little or no protection against reinfestation.

#### **Lindane-Pine Oil Remedy**

An improved remedy for the destruction of the spinose ear tick is made by mixing lindane with pure pine oil. Lindane, the insecticidal

agent in the mixture, is produced commercially as a wettable powder and as an emulsifiable concentrate, the latter now being more commonly used. Both products contain 25 percent of gamma isomer. The recommended strength of the ear tick remedy is 1 percent of gamma isomer. To make a product of this strength, thoroughly mix 4 parts of emulsifiable concentrate containing 25 percent of gamma isomer with 96 parts of pure pine oil. This remedy is safer than earlier remedies that contained inflammable hot xylol.

This mixture flows freely from a spring-bottom oiler in winter as well as in summer. It causes no irritation and does not tend to collect dirt in the ears of the animals. The mixture penetrates the masses of ticks and ear wax, and rapidly kills all larvae and nymphs. It also protects the ears against reinfestation for about 3 weeks or longer, even where opportunity for reinfestation with the ear tick is great. Livestock on large pastures and ranges, where reinfestation usually takes place slowly, are protected for more than a month.

### **Chlordane-Pine Oil Remedy**

Chlordane, an insecticide closely related to BHC (benzene hexachloride) and lindane, is also effective against the spinose ear tick. Chlordane compares favorably with lindane in that it quickly destroys the nymphs and larvae. However, it gives protection against reinfestation for a slightly shorter time.

Emulsifiable chlordane can be mixed directly with pure pine oil and used in the same manner as the lindane mixture. The emulsifiable concentrate usually contains 74 percent of pure chlordane. The percent of chlordane recommended in the mixture is approximately 5 percent. This strength can be obtained by adding 7 parts of the emulsifiable concentrate to 93 parts of pure pine oil.

It should be applied in the same manner and in the same quantities as the mixture made with lindane.

### **Pyridine-Adhesive Remedy**

A remedy developed by the Bureau of Entomology and Plant Quarantine called Stock 1029,<sup>3</sup> is a mixture of pyridine in an adhesive containing 45 percent of rosin, 40 percent of hydrogenated methyl abietate (commercially sold as Hercolyn), and 15 percent of dibutyl phthalate. This remedy destroys ear ticks effectively and provides reasonable protection from reinfestation for considerable periods of time.

The adhesive base, called Adhesive A58, is made up by blending all the aforementioned ingredients except the pyridine under cautious application of heat and constant stirring until the rosin is liquefied. The operation should be carried out in a well-ventilated room or in the open, and care taken not to overheat the mixture. After the mixture has been allowed to become almost cool, 10 percent by weight of pyridine (practical grade) is added and the resulting product (Stock 1029) stirred into a uniform preparation. Pyridine is inflammable and must be kept away from open flame.

<sup>3</sup>For full details of this remedy, consult Bureau of Entomology and Plant Quarantine Mimeograph No. E-695, Control of the Ear Tick.

## **Pine Tar-Cottonseed Oil Remedy**

An effective remedy against ear ticks was formulated by the Bureau of Animal Industry some years ago and thoroughly tested during its early field investigations. This remedy consists of a mixture of 2 parts by volume of ordinary commercial pine tar and 1 part by volume of cottonseed oil. In mixing the ingredients, add the cottonseed oil to the pine tar and stir until a uniformly smooth mixture is obtained. When the weather is cold the pine tar and cottonseed oil should be warmed so they will mix readily and flow freely, but they should not be heated more than is necessary. The mixture will remain uniform for a long time without separation or deterioration. It is relatively inexpensive, easy to prepare, and when properly applied, it kills the ticks and does not injure the animals. It may be used on any species of domestic animals.

Cottonseed oil is a fairly good solvent for ear wax. The pine tar-cottonseed oil mixture penetrates ordinary loose masses of ear wax and ticks, but it will not penetrate the hard masses. It kills all ear ticks with which it comes in contact, and being of a sticky consistency, it remains in the ears and protects the animals against reinestation for approximately 1 week.

## **Restraining Animals for Treatment**

The farmer who has but a few gentle farm animals to treat does not need any special equipment for restraining them during treatment. They may be tied to a post, held by an attendant, or restrained by any of the well-known methods. But in treating herds of semiwild range cattle or horses, it is necessary to provide special equipment. Most animals resist the insertion of anything into their ears; therefore, restraint is often necessary. A dehorning chute equipped with a stanchion is one of the best arrangements for restraining cattle. Branding chutes with "squeeze gates" are also satisfactory for this purpose. The entrance chute at dipping corrals, or any other available cattle chute, may be used (fig. 4).

If it is necessary to construct a chute especially for the purpose, it should be about  $2\frac{1}{2}$  feet wide and from 4 to 6 feet high, depending on the nature of the animals to be treated. When the sides of the chute are more than 4 feet high, footboards should be constructed along the sides so that the operator may work over the top of the chute and not through the openings in the sides. When cattle are crowded closely in the chute, with the exit and entrance closed, they may be treated without additional restraint. However, confining the head in a "squeeze gate" (fig. 3) invariably permits a more thorough job and also provides greater safety for the operator.

## **Instructions for Treating Animals**

An ordinary metal spring-bottom (press-bottom) oiler of about 1-pint capacity is a very suitable instrument for injecting the lindane-pine oil, chlordane-pine oil, and pine tar-cottonseed oil ear tick mixtures into the ears (fig. 5). The spout should be cut off so it will be only 2 inches long, thereby creating a spout opening about three-

eighths of an inch in diameter. A piece of flexible soft rubber tubing, with a  $\frac{3}{8}$ -inch inside diameter,  $2\frac{1}{2}$  inches long should be slipped over the oiler spout, and the rubber should extend about one-half inch



Figure 4.—Chute filled with cattle ready for treatment; one side of the chute is made of iron pipes.

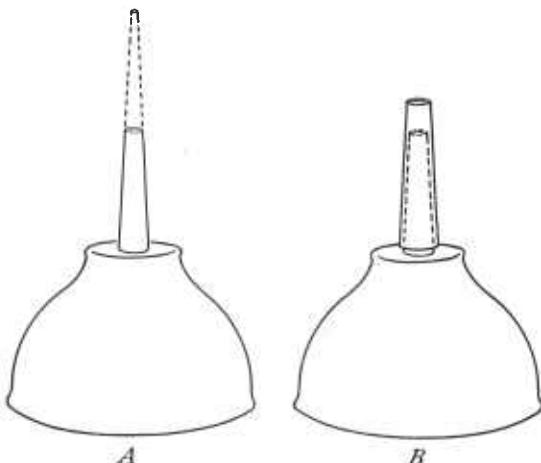


Figure 5.—A, Spring-bottom oiler showing spout cut off at 2-inch length; B, spring-bottom oiler showing rubber tubing,  $2\frac{1}{2}$  inches long and  $\frac{3}{8}$  inch in diameter, slipped over spout.

beyond the end of the spout tip. The tubing will guard against injury to the delicate inner lining of the ear by the sharp edges of the metal spout-tip while the oiler spout is being inserted.

When the pine tar-cottonseed oil mixture is used, it must be warmed to about body temperature so it will flow readily from an oiler. The

lindane-pine oil and chlordane-pine oil mixtures flow freely when cold.

Fill the oiler with the medicine, grasp the ear with the left hand, insert the oiler spout into the opening of the ear canal, and inject one-half ounce into each ear. While the injection is being made, the ear should be manipulated with the left hand so as to facilitate the spread of the mixture over the entire inner surface of the ear (fig. 3). Hold the ear in an upright position for a few seconds after the injection to allow the fluid to settle into the canal. When the hold on the ear is loosened, the animal will shake its head violently, throwing out the excess of the mixture.

A 6-quart garden sprayer with an adjustable nozzle and lever cut-off has recently been used for applying the lindane-pine oil and chlordane-pine oil remedies. With the sprayer these remedies can be quickly and safely inserted at a low pressure into the ears of the animals. It is especially effective in treating large numbers of cattle in crowding chutes.

These small sprayers are sold by most hardware and garden supply firms, equipped with an 18-inch length of small, light-weight tubing between the nozzle and cutoff grip. The arrangement, however, proved to be too long, as well as too fragile, for use along cattle chutes. Therefore, the light-weight tubing was removed and replaced with a more sturdy  $\frac{1}{4}$ - by 6-inch galvanized pipe nipple fitted with a  $\frac{1}{4}$ - by  $\frac{3}{8}$ -inch reducer at one end and a coupling at the other. The original cutoff grip was threaded into the reducer, and the original nozzle tip was brazed onto the coupling at the other end. Links were soldered to the top and bottom edges of the sprayer tank (fig. 6), and a shoulder strap was fastened to the links for easier carrying. Only thin-liquid remedies can be used in this sprayer.

The nozzle on the sprayer should be adjusted to discharge a cone spray 2 inches in diameter at a distance of 4 inches from the nozzle. To operate the sprayer, insert the smooth, rounded end of the nozzle in the ear (fig. 7), and at the same time release the cutoff by pressing the lever. The cone spray of the liquid medicine instantly covers all the inner surfaces of the ear before the animal can move its head away. Subsequent manipulation of the ear is not necessary. If large numbers of cattle are to be treated, it will be well to speed up the operation by having a man work on each side of the chute.

The lindane-pine oil and chlordane-pine oil mixtures penetrate the hard masses of ticks and ear wax. Their free-flowing quality permits rapid and complete distribution over the surface so that there is no need for breaking the ear-wax masses, except in the most extreme instances. These preparations readily contact all larvae and nymphs in the ear, kill them rapidly, and are not irritating to the inner surface of the ear and adjacent skin areas.

The pine tar-cottonseed oil mixture kills only the ticks with which it comes in contact; consequently, if the ear passages contain hard masses of ticks and ear wax, such masses should be broken down and scraped out with a wire loop (fig. 2) before treatment is applied.

If an excessive quantity of the fluid is injected, the surplus overflows from the ears and runs down over the head and face, where it may cause irritation, especially in horses. It causes little or no irritation in the ears, but if it comes in contact with those parts of the skin

covered with hair that are exposed to the sun, irritation results and the hair may come out. No more should be applied than the ear will retain; about one-half ounce in each ear is sufficient for cattle and horses.

The pyridine-adhesive remedy (Stock 1029) should be applied to the ears with a 1-inch paint brush. A brushful of the mixture should be inserted well down into the outer ear and rubbed about enough

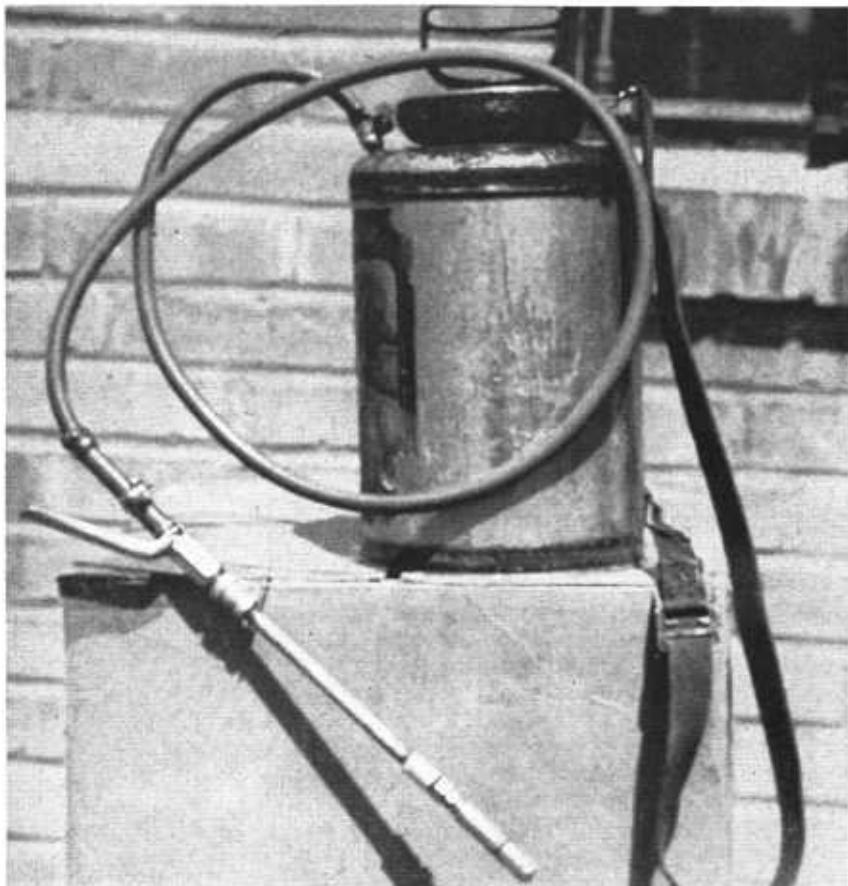


Figure 6.—Small garden sprayer adapted for use as applicator for thin liquid remedies.

to insure complete coverage of the deep folds and the inner surface of the outer ear.

One gallon of any of these remedies will treat about 125 head of cattle.

After having had sufficient practice to become familiar with the operation, one man can treat 30 or more cattle an hour. In treating large herds, two or more men may work along each side of the chute. In this way a large number of animals can be treated in a day.

## Number of Treatments Necessary

When properly used, one application of any of the aforementioned ear tick mixtures is usually sufficient to kill all the ticks at the time. However, the tick does not deposit its eggs in the ears of the animal, and a new crop of seed ticks may find lodgment at any time on animals kept in infested places.

The lindane-pine oil and chlordane-pine oil mixtures contain no special adhesive but nevertheless cling to the inner lining of the ears for a considerable period. Cattle are protected against reinfestation for at least 3 weeks in areas where ticks are abundant, and for well



Figure 7.—Treating cattle in a crowding chute with small garden sprayer.

over a month where ticks are few. A comparable period of protection from reinfestation appears to be given by the pyridine-adhesive remedy (Stock 1029). The pine tar-cottonseed oil mixture remains in the ears for a short time and may be depended upon to protect the animal against reinfestation for only about a week, although in some cases it seems to protect longer.

Cattle are generally more heavily and much more rapidly reinfested with ticks when confined in old corrals and small pastures than when grazed on large, open ranges. The opportunity for the animals to contact masses of seed ticks is naturally greater in small, confined areas.

Infested pastures contain particularly heavy concentrations of ticks in the soil and debris under and around salt troughs. These ticks are readily killed by spraying such areas with a mixture prepared from equal parts of kerosene and used lubricating oil. Destroying ticks in this manner is a valuable aid in control.

Animals in the infested area should be examined frequently and treated as often as necessary, preferably at 2-month intervals, to protect them against the discomfort and losses caused by ear ticks. Herds grazing on infested ranges should at least be treated late in the fall or early in the winter to prevent losses caused by the ticks in poorly nourished range cattle. All animals in an infested herd should be treated whether they appear to have ticks or not.

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